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ABSTRACT

Ninety educable mentally retarded (EMR) adolescents listened to recorded material with and without oral advance organizers in an evaluation of the effectiveness of instructional techniques derived from subsumption learning theory on their learning and retention of meaningful information. Ss were randomly assigned to either an experimental group, which listened to an expository advance organizer and a subsequent learning passage; a traditional group, which listened to a traditional introductory passage and the same learning passage; or a control group. Analysis of criterion measures administered to measure learning and retention revealed that the difference between the mean learning scores of the experimental and traditional groups was not significant, and that retention scores did not differ significantly from learning scores. It was concluded that use of an expository advance organizer was no more effective than traditional expository techniques when information was presented orally to EMR adolescents. (LS)

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EFFECT OF AN ORAL ADVANCE ORGANIZER ON THE LEARNING AND RETENTION OF EMR ADOLESCENTS

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ABSTRACT

The use of advance organizers to assist in the comprehension of recorded material is often felt to be a viable approach. Recorded material, unlike a printed book, does not allow quick scanning prior to listening. The listener must begin the listening experience with little understanding of the scope of the material that is about to be encountered. An advance organizer is often used to provide this initial understanding for the listener. This paper reports an investigation with educable mentally retarded children where the use of an advance organizer did not prove effective.

This investigation was designed to evaluate the effectiveness of instructional techniques derived from subsumption learning theory on the learning and retention of meaningful information by EMR adolescents. It was found that the use of an expository advance organizer was no more effective than traditional expository techniques when information is presented orally to these subjects.

EFFECT OF AN ORAL ADVANCE ORGANIZER ON THE LEARNING AND RETENTION OF EMR ADOLESCENTS

A. Edward Blackhurst

A rational approach to the education of educable mentally retarded (EMR) children is to employ various theories of learning to serve as a conceptual foundation for the development of instructional techniques. However, there is little research of this type reported in the literature. The majority of studies which have attempted to relate theories of learning to mental retardation have been laboratory investigations concerned with such dimensions as rote, serial, and discrimination learning (Ellis, 1963), as opposed to the investigation of the learning and retention of meaningful information. Generally, these studies provide little helpful information for the educational practitioner because the investigators, in interpreting their findings, do not often draw implications for instructing the mentally retarded. McPherson (1958) indicates that, in the past, this has often been due to the investigators' interest in the mentally retarded "...because of their usefulness for learning data and theory per se, rather than because of an interest in this type of learner" (p. 876).

The need for research on instructional techniques for the mentally retarded which stem from organized theoretical positions of how meaningful information is learned and retained is evident. One position, which has not been applied to the mentally retarded, is subsumption learning theory (Ausubel, 1963).

This theory is based on the concept that **meaningful material is more quickly learned and better retained than rote material** and attempts to specify a method whereby meaningful verbal material is learned and remembered. The method is based on the theory that **information that has been learned is arranged and stored in a hierarchical fashion in the learner's cognitive structure.**

With respect to a specific subject matter area, cognitive structure can be viewed as the hierarchical arrangement of information that is progressively differentiated in descending order of generality, abstraction, and inclusiveness. In other words, less general concepts are placed, or subsumed, under more inclusive concepts higher in cognitive structure.

According to Ausubel (1963), meaningful learning and retention occur when new material is placed (subsumed) in a nonarbitrary, nonverbatim fashion in an appropriate location in the learner's cognitive structure. Based upon this hypothesized arrangement of cognitive structure and the operations involved in the learning and retention of new material, Ausubel (1963) proposes that cognitive structure can be manipulated to facilitate the reception and retention of new material. He suggests that special introductory passages, called advance organizers, can be employed to provide the learner with the appropriate subsumers for subsequent learning tasks. An advance organizer should provide concepts, principles, and information (subsumers) that are more general, abstract, and inclusive than the information in the learning passage. The advance organizer theoretically provides concepts under which the details in the learning passages can be placed (subsumed).

Studies have supported the efficacy of the advance organizer technique with individuals of average and above-average intelligence (Ausubel, 1960; Ausubel and Fitzgerald, 1961; Ausubel and Fitzgerald, 1962; Scandura and Wells, 1967). While there is no direct evidence to support the application of techniques derived from subsumption learning theory to the mentally retarded, one study (Ausubel & Fitzgerald, 1962) showed that the use of an advance organizer facilitated learning in senior undergraduate students with poor verbal ability. This finding certainly cannot be generalized to the retarded. Nevertheless, since the mentally retarded are considered to be poor in verbal ability (Robinson & Robinson, 1965, p. 484), the above finding suggests that the organizer technique should at least be studied for its effect on these individuals.

PROBLEM

This investigation was conducted in an attempt to determine whether instructional techniques derived from subsumption theory are more effective than traditional expository techniques when information is presented orally to educable mentally retarded adolescents.

It was hypothesized that EMR adolescents who listened to an expository advance organizer and a subsequent learning passage would score significantly higher on criterion measures of (a) learning and (b) retention than EMR adolescents who listened to a traditional introductory passage and the same learning passage.

(Editor's Note: A description of the methods and results of the study are found follow[illegible]he **Discussion.** *The following paragraphs excerpted from a later section of this paper briefly state the results of the investigation.)*

"...it was concluded that both the experimental and traditional groups learned the information which was presented; but there was no difference between the groups in the extent to which the information was learned. Therefore, the hypothesis that EMR adolescents who listened to an advance organizer and a subsequent learning passage would perform significantly higher on a criterion measure of learning than EMR adolescents who listened to a traditional introduction and the same learning passage, was not supported."

"...the hypothesis that EMR adolescents who listened to an expository advance organizer and a subsequent learning passage would perform significantly higher on a criterion measure of retention than EMR adolescents who listened to a traditional introduction and the same learning passage, was not supported."

DISCUSSION

If the use of advance organizers actually does facilitate learning, and if EMR adolescents are capable of learning by this method, th[illegible] research hypotheses should have been confirmed. The failure [illegible] confirm the hypotheses could be due to limitations in (a) instrumentation, (b) experimental design, or (c) characteristics of mentally retarded learners.

Since the pilot studies indicated that retarded adolescents were capable of learning the material and the panel of judges indicated that the advance organizer and traditional introduction met the criteria, it was concluded that weaknesses in instrumentation did not contribute to these findings. Likewise, the experimental design was not considered to contribute to the findings as Campbell and Stanley (1963) consider it to be one of the strongest designs for educational experiments.

Therefore, it was concluded that the main reason for the failure to support the research hypotheses was that **mentally retarded learners cannot effectively perform the operations that are necessary if one is to benefit from teaching techniques derived from subsumption learning theory.** Ausubel (1963) states:

> If cognitive structure is stable, clear, and suitably organized, valid and unambiguous meanings emerge and tend to retain their individuality or dissociability. If, on the other hand, cognitive structure is unstable, ambiguous, disorganized or chaotically organized, it tends to inhibit learning and retention (p. 26).

The use of organizers assumes that they will assist in bringing this order to an individual's cognitive structure by providing concepts under which subsequent details can be subsumed. On the basis of the above statement by Ausubel, however, it becomes appropriate to ask how the advance organizer, itself, will be learned if an individual has a "disorganized" cognitive structure. In other words, if the organizer cannot be incorporated into cognitive structure it would not be expected to facilitate learning or retention.

Since it is well-known that the mentally retarded are characterized as having difficulty in learning information, it could be posited—although there is no direct evidence—that this may be because they have "unstable, amgibuous, disorganized or chaotically organized" cognitive structures. If this is the case, they would have difficulty incorporating an advance organizer into cognitive structure; and, consequently, the organizer would be of little help in learning subsequent material.

Closely related to the above problem is the concept of cognitive style. "Cognitive style refers to self-consistent inter-individual differences and idiosyncratic trends in cognitive organization and functioning" (Ausubel, 1963, p. 76). It seems reasonable to assume that an individual's cognitive style is dependent, to a certain extent, on past experience, *i.e.*, it develops partially as a function of previous learning.

It is common practice in teaching the mentally retarded, to start with specific concepts and gradually progress to generalities, and to also progress from the concrete to the abstract. Although there is no direct evidence, it is possible to suggest that this method of instruction would affect an individual's cognitive style. If this is true, the EMR adolescents who have had several years of instruction based on the above methods might not have cognitive styles that are conducive to the utilization of advance organizers—which present abstractions and generalities prior to the presentation of more specific information.

Therefore, in order to effectively use advance organizers with the mentally retarded, it may be necessary to attempt to modify their cognitive styles by specifically teaching them how to use advance organizers to assist them in learning subsequent material. In essence, this would be an effort to establish a learning set (disposition to learn or perform in a particular way) that would be conducive to the use of organizers.

The use of advance organizers can also be viewed as an application of the transfer of learning paradigm, in which the organizer is expected to facilitate the learning of subsequent information. The research evidence on the ability of the mentally retarded to transfer learning has been confined largely to the results of laboratory investigations which used procedures unrelated to classroom learning (Denny, 1964; Zeaman & House, 1963). These investigations indicate that the mentally retarded do have the ability to transfer learning. However, it is the opinion of educational specialists Kirk and Johnson (1951) that the EMR are poor in the ability to transfer learning in the actual classroom learning situation. It might be concluded, then, that mentally retarded individuals would have difficulty in transferring the information in the organizer to the subsequent learning passage. If this is true, it would furnish another explanation for the findings in this investigation.

An additional consideration is suggested. By definition, an advance organizer contains information that is more abstract than the material it precedes. It follows, then, that a learner who has difficulty dealing with abstract concepts would not be able to effectively utilize the abstract concepts presented to him in the organizer.

Using the terminology of Piaget, Robinson and Robinson (1965) indicate that educable mentally retarded persons can be "...characterized as unable to progress beyond the level of concrete operations" (p. 357). Therefore, it might be concluded that the organizer technique, with its emphasis on the ability of the learner to perform abstract operations, would not be effective when used with the mentally retarded.

IMPLICATIONS

Based on the results of this investigation, two implications seem warranted. First, since the advance organizer technique has been found to be effective with persons of average and above-average intelligence, additional research should be performed to determine if EMR children can be **taught** to learn and retain information via this method. If so, this would have broad implications for special education programs.

The investigator found that it was quite difficult and time consuming to construct an advance organizer which met the theoretical criteria. Therefore, since the investigation did not support their use, the second implication is that teachers of EMR adolescents should not employ expository advance organizers for instructional purposes at this time.

METHOD

Instrumentation

Six instruments were constructed for this investigation: (1) a 1,467 word learning passage pertaining to the process involved in passing legislation in the United States Congress. This topic was selected because a test of the advance organizer technique requires that the learner has a minimum amount of prior knowledge concerning the learning task. In addition, the material must have inherent logic (as opposed to being only an arbitrary collection of factual information) so that an organizer can be written specifically for it (D. P. Ausubel, personal communication, June, 1965); (2) a 362 word advance organizer which contained general concepts under which many of the details of the learning passage could be subsumed and which was written according to Ausubel's (1963) criteria; (3) a 378 word traditional introduction which was related to the topic, but not the substance, or the learning passage; (4) a twenty-question multiple choice criterion measure; (5) an evaluation form for use by a panel of judges to determine whether the advance organizer met the criteria for the investigation and whether the traditional introduction did not contain organizing concepts; and (6) materials that were completely unrelated to the topic of the learning passage for use with an additional control group.

Using the evaluation form, a panel of twenty judges verified that the passages met the stated criteria. All materials were then recorded on Mylar magnetic audio tape at 3 1/2 inches per second on a Wollensak T-1500 monaural tape recorder. Since Spicker (1963) concluded that comprehension of EMR students was effective at a rate of 125 words per minute, all passages were recorded at that rate. Two pilot studies were then performed to ascertain that EMR adolescents could learn the material, could respond to the test items which were administered orally, and would not score higher than chance if they heard only the introductory passages. After revising the materials, the results of a third pilot study indicated that it was appropriate to proceed with the main investigation.

Sample

Ninety EMR adolescents were selected for the main investigation. All subjects were enrolled in special education classes in special schools that were under the jurisdiction of a large county school system in Western Pennsylvania. Subjects were randomly assigned to a experimental group (**E**), a traditional group (**T**), and a control group (**C**). Descriptive data for the three groups appear in Table 1.

TABLE I

SEX DISTRIBUTION, INTELLIGENCE TEST SCORES, AND CHRONOLOGICAL AGES OF THE SAMPLE

	Experimental Group	Traditional Group	Control Group
Males	17	17	22
Females	13	13	8
Total N	30	30	30
Mean IQ	71.03	70.90	71.80
S. D.	8.00	6.93	8.30
Range	55-89	57-83	53-86
Mean CA (Mos.)	197.00	192.43	195.67
S. D.	12.63	9.21	12.12
Range	181-228	178-213	176-225

Procedure

A modified Posttest-Only Control Group Design (Campbell & Stanley, 1963) was utilized for the main investigation. On the first, second, and third days subjects in **E** received the advance organizer while subjects in **T** received the traditional introduction, and those in **C** received an introductory passage that was unrelated to the information presented to groups **E** and **T** (information on poisons). On the third day, immediately following the presentation of the introductory passages, **E** and **T** received the learning passage, while **C** received an unrelated learning passage.

The learning passage was again presented to **E** and **T** on the fourth day, followed by the administration of the criterion measure. At the same time, the subjects in **C** received the unrelated learning passage and a test on the information it contained. In addition, the criterion measure that was administered to the subjects in **E** and **T** was also administered to those in **C**. Twelve days later, the criterion measure was again administered to groups **E** and **T** to obtain a measure of retention.

On the days that treatment was administered, subjects assigned to each group were sent to one of three classrooms to hear the tape recorded materials appropriate for that particular day. Treatment was administered simultaneously by teachers, according to directions supplied by the investigator.

Testing procedure required that subjects listen to each question and the answer options twice and then respond by circling the letter in front of the answer which they considered to be correct. The test answer sheets contained only the answer options.

Data Analyses

The total number of correct responses was tabulated for each subject. A one-way analysis of variance (Edwards, 1960) was computed to determine if significant differences existed among the mean scores of the experimental, traditional, and control groups on the first administration of the criterion measure. Duncan's New Multiple Range Test (Edwards, 1960) was also applied to the data.

Retention scores were obtained on only the experimental and traditional groups. These scores were analyzed by computing t tests for correlated means (McNemar, 1962) between the first and second tests for both the experimental and traditional groups. In each statistical analysis, the .05 level of confidence was preset as the criterion for rejecting the null hypothesis.

RESULTS

On the first administration of the criterion measure (measure of learning), the mean scores of the experimental, traditional, and control groups were 9.666 (S. D. = 3.037), 8.366 (S. D. = 3.526) and 6.333 (S. D. = 2.440), respectively. An F-Max test (Winer, 1962) for homogeneity of variance of these scores yielded a non-significant ($P > .05$) F of 1.445. Therefore, it was concluded that the variances of the score distributions of the three groups were not different and that it was appropriate to proceed with the analysis of variance.

A summary of the analysis of variance is presented in Table II.

TABLE II

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE LEARNING SCORES

Source of Variance	Sum of Squares	df	Mean Square	F
Between Groups	169.355	2	84.678	8.894*
Within Groups	828.301	87	9.521	
Total	997.656	89		

*P < .05

The significant F of 8.894, reported in Table II, indicates that it was appropriate to reject the null hypothesis and conclude that there was a significant difference among the means of the three groups.

Duncan's New Multiple Range Test (Edwards, 1960) was then applied to the data to determine between which means this difference existed. The results of this analysis indicated that there was a significant difference between (a) the mean scores of the experimental and the control groups and (b) the mean scores of the traditional and control groups. The difference between the mean scores of the experimental and traditional groups was not significant.

Based on the above analyses, it was concluded that both the experimental and traditional groups learned the information which was presented; but there was no difference between the groups in the extent to which the information was learned. Therefore, the hypothesis that EMR adolescents who listened to an advance organizer and a subsequent learning passage would perform significantly higher on a criterion measure of learning than EMR adolescents who listened to a traditional introduction and the same learning passage, was not supported.

On the second administration of the criterion measure (measure of retention), the mean score of the experimental group was 8.318 (S. D. = 3.770) while the mean of the traditional group was 9.181 (S. D. = 2.876). There was an attrition of eight subjects in the experimental group.

To determine whether retention scores differed significantly from learning scores, t tests for correlated means (McNemar, 1962) were computed. These analyses yielded t values of 0.499 and 0.201 for the experimental and traditional groups, respectively. Neither of these was significant (P > .05). Therefore, the hypothesis that EMR adolescents who listened to an expository advance organizer and a subsequent learning passage would perform significantly higher on a criterion measure of retention than EMR adolescents who listened to a traditional introduction and the same learning passage, was not supported.

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